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Tetra Laval Holdings & Finance SA

Packaging, blank for same and process for the production of the packaging

The invention concerns a packaging for a liquid and/or a loose material, which is formed from flat packaging material having fold lines and a marking applied to a wall panel of the packaging. The invention further concerns a blank for the production of such a packaging and a process for the production of a packaging which is made from a moving web. An apparatus for carrying out the process is characterised by special reading devices.

Packagings of the kind set forth in the opening part of this specification are known in many different forms and are frequently used for packaging liquid foodstuffs, for example milk or juices which can also contain pieces of fruit. Packagings, blanks for same and also processes for the production thereof are known, in which a web of packaging material is moved through various processing stations and receives fold lines which are used for shaping the material web and forming the packaging. The packaging which is in the process of being produced is filled and closed prior to, upon or after the shaping operation.

It is also known for markings to be printed on packagings and read off photoelectrically in order to control items of equipment in production of the packaging. The known marking comprises a register or bar code and is printed on the packaging with tolerances of $\pm$ 1 mm. By reading that bar code the intention is to control printing mechanisms so that they also print a piece of decoration in proper register relationship on the surface of the packaging in various colors. It has been found however that a piece of printing is frequently defectively positioned and suffers from a displacement in relation to the web of the packaging material. In addition, due to environmental influences, the bars of the bar code and in particular the transition thereof from black to white can alter, with the consequence that reading and control errors occur. Thus it has been found that, when using composite material with paper as the carrier material, temperature and moisture influences have a considerable effect. Stretching of the web can already occur in the paper mechanism when processing the raw material. In the paper mechanism the paper is possibly coated (plastic material, aluminum foil and so forth), provided with fold lines and generally also with cut lines. The web material is frequently delivered on rolls and also leaves the paper mechanism after processing on rolls, possibly already on individual rolls. Frequently the filling machine is arranged separately from the paper mechanism and receives the individual rolls from which filled and closed packagings are produced. Influences due to temperature, moisture and so forth can also occur in the filling machine. Such changes in the paper mechanism, between the paper mechanism and the filling machine or also in the filling machine are to be detected and used to control the material web so that not only an

item of decoration, possibly also of multi-color nature, can be correctly printed in the desired manner on the surface, but also the shaping and folding operations take place at the correct location, including the placement of cuts when separating the filled packagings into individual items.

A marking which is applied by printing is admittedly helpful to a great extent but from time to time suffers from the same errors as the errors involved in printing.

The invention is based on the notion that the lines of a marking can be formed not necessarily only by printing but in accordance with the invention by stamping. Stamping of the material to produce a pack has essential properties in regard to the quality of the pack. If the stamping is at the correct location on the packaging material or if an item of information about the position of the stamping is passed to the processing machine, the pack can be shaped precisely, it is stable in itself, it is strong and it stands up correctly. In the case of composite material with paper or card as the carrier material, there are packs with corner flaps which have to be folded over at the correct location. That is also effected precisely and easily with correct stamping.

The invention therefore takes up the idea of applying the marking by stamping instead of by printing. The operation of reading a printed marking is a further source of error because, as is known, many optical systems are sensitive and represent sources of error. Printed marking also permits measurement only in a linear direction.

Therefore the object of the invention is to provide a packaging, a blank for same and a process for the production of a packaging, so that the production of the packaging can be implemented more easily, less expensively and with a higher degree of precision.

In accordance with the invention that object is attained for the packaging in that the marking is formed by stamping lines which are disposed in a plane and of which at least two straight stamping lines intersect at least when they are prolonged. In this embodiment the marking is flat or at least substantially so flat as is possible with the known natural substances. It is possible to stamp paper, card, plastic materials and metal foils. The operation of stamping the most widely varying forms of line can be implemented by known tools, for example two oppositely moving rollers of which one has raised portions and the opposite one has recessed portions. It has proven desirable in accordance with the invention that the marking with the stamping lines has at least two straight stamping lines which either already intersect in the marking or which intersect at least when said lines are prolonged or in respect of the prolongation thereof or mathematically (virtually). Such patterns permit rapid precise reading of the marking and contain important items of information which can either be recorded at the entry end of the machine in question and used for the further progress of the web of material, or which are established and used at an upstream machine in order to suitably control the web of material in a downstream-disposed machine. Thus for example from the paper mechanism items of information in respect of elongation of the material can be measured after the stamping operation until the discharge from the paper mechanism.

In accordance with the invention it has admittedly also been considered using the fold lines required for folding and shaping of the pack in part at the same time as the marking. However the above-described embodiment is described as a preferred configuration, in which a separate marking is applied with separate stamping lines to the material of the packaging. While ink is also continuously consumed in the printing procedure, which is a disadvantage, marking by stamping can be produced without a comparable consumption of material. In the case of a marking produced by stamping the surface in question of the packaging does not need to be provided in a wall panel which is left white or untouched by the decoration. In optical terms, the marking produced by stamping is not seen at first glance. It could possibly even extend into an area of decoration.

In accordance with the invention it has been found to be desirable if the marking has at least one center-symmetrical configurational pattern. Center-symmetrical are all geometrical configurations or patterns which are disposed in one plane and which after rotation through 180° in that plane around a fixed point are in mutually aligned relationship. Thus for example any line is in center-symmetrical relationship with its center point. Any straight line is center-symmetrical in relation to any point thereon. Any beam is center-symmetrical in relation to its reflected beam. Two straight lines which intersect are center-symmetrical in relation to their apex point. Apex angles are also center-symmetrical configurations. The lozenge or rhombus and rhomboid also constitute center-symmetrical configurations. The invention makes use of the properties of the center-symmetrical configuration for the marking because, by virtue thereof, a large number of important items of information can be read from or derived from the marking, which are useful for controlling the subsequent processing stations.

Thus in accordance with the invention, in a preferred embodiment, it is desirable if the marking has an outer rectangular frame whose sides in the blank extend parallel to the longitudinal fold lines of the packaging and a parallelogram is inscribed into that outer rectangle (the frame). More especially it is particularly advantageous in that respect in accordance with the invention if in the case of a rhombus as a parallelogram its two diagonals in the blank of the packaging extend parallel to the longitudinal and transverse fold lines of the packaging. In the case of the rhombus the diagonals are in mutually perpendicular relationship. In that case the diagonals bisect the angles of the parallelogram. In accordance with the invention, with a marking applied in that way, more accurate positioning of the packaging material is achieved when producing the packaging.

As is known:

a square is an equal-sided right-angled parallelogram;

a rectangle is an unequal-sided right-angled parallelogram;

a rhombus is an equal-sided obtuse-angled parallelogram, and

a rhomboid is an unequal-sided obtuse-angled parallelogram.

If such a parallelogram is used as a center-symmetrical configuration in the marking, then that parallelogram describes the kind of pack. For example the rhombus describes a square pack and the rhomboid describes a rectangular pack.

If a parallelepipedic pack is cut perpendicularly to its longitudinal center line, in general terms therefore along a horizontal plane, then the cross-section of such a pack along the section line is square or rectangular. Long-life milk is generally packaged in Europe at the present time in rectangular packs while fresh milk is packaged in square packs. The rectangular packaging has in each case two wide side wall panels and therebetween two narrow side wall panels, in respective mutually oppositely disposed relationship. As is known the pack diagonal is an important factor in terms of determining the pack volume. The pack diagonal e can be calculated from the width of the side wall panels. In the case of the square pack the two side wall panels are of equal width and for example are of a width B'. In that case the following applies:

pack diagonal $e = B' \times \sqrt{2}$.

In the case of a rectangular pack the wide side wall panel is for example of the width B' and the narrow side wall panel is of the width C'. In that case the following applies for the pack diagonal:

$$e = \sqrt{B'^2 + C'^2}$$

As is known the repeat length of the pack blank also plays an important part, that is to say the length in the direction of travel of the blanks in the machine. If we have that repeat length on the one hand and the pack diagonal e on the other hand, it is possible to draw conclusions about the pack volume which ultimately is important.

Using the marking with the parallelogram inscribed in the described manner, for example a rhomboid, it is possible to measure and read off values which provide information about the shaping procedure and the correct volume of the pack. The web of the pack blanks moves past at least one stationary sensor in such a way that the sensor beams have an opportunity to scan the marking and read off the values in question. They are compared to reference values which have been previously read in. If the difference is zero then the pack in the process of being formed is in the correct angular position and involves the correct volume and the correct shaping.

Irrespective of the configuration of the marking in question, in accordance with the invention, it is also envisaged that two separate markings are applied to different locations on the surface of the packaging. In that way for example different diameters of a tube can be measured and thereby the overlap seam can be adjusted. On the other hand it is also known that three sides of the packagings are predetermined by the manufacturing procedure. The third side through which the longitudinal seam passes is dependent on how precisely the machine operator sets the overlap (an excessively small or an excessively large overlap gives rise to a trapezoidal packaging). The position of the overlap can be accurately determined and automatically adjusted by a second marking.

It is also advantageous if in accordance with the invention a second inner rectangle is inscribed in the outer rectangle (the frame) in such a way that two sides coincide with the sides of

the outer rectangle, which in the blank extend parallel to the longitudinal fold lines and the other two sides touch the connecting corners of the rhombus in such a way that the corners bisect the sides. In the case of a parallelepipedic packaging the sides of the marking are not bisected by the rhombus. A particular embodiment of the packaging is that which is produced from a material web in which one blank follows after the other. In addition each pack has a longitudinal center line, in relation to which two sides of the outer rectangular frame extend parallel, in the blank. Parts of those two sides coincide with said two sides of the inscribed smaller rectangle. That smaller rectangle is laid around the rhombus in such a way that all four sides of the smaller rectangle coincide with or touch the corners of the rhombus. Therefore the smaller rectangle has been circumscribed around the rhombus.

It is particularly advantageous if in accordance with the invention the marking has a mathematical correlation with the packaging blank such that the spacings between points on the marking describe the geometry of the fold lines. Thus for example the spacings of the transverse sides of the large rectangle perform the task of describing the so-called repeat length of the blank of the packaging, that is to say the pack material length. The blank has longitudinal and transverse fold lines which for example can also be produced by stamping. The repeat length or the length of the pack material is that length which can be measured between two markings which occur in succession in the direction of conveying movement of the blanks in manufacture, at the appropriate location thereof, for each blank carries a marking. The above-mentioned rectangle of the marking therefore provides in encoded form a clear measurement in respect of that repeat length. The same also applies in regard to the height of the smaller inscribed rectangle which for example signifies the width of a narrow side wall panel. Equally it is possible to read from other spacings the overall transverse length of a blank in transverse relationship to the longitudinal fold lines, the width of a wide wall panel of the packaging or also the diagonal of the blank. It is also possible to determine the position (rotation about the longitudinal and transverse axes) of the packaging material.

The invention is further characterised in that the stamping lines project in raised relationship at least partly out of the surface of the wall panel and/or are set back in recessed relationship into the surface of the wall panel. In the preferred first embodiment the stamping lines project in raised relationship out of the surface of the wall panel. Therefore, when feeling the wall panel of the packaging, they can be felt as portions of increased height. It will be appreciated that they can also be seen with suitable light and shadow. In the same or in a different marking or in the case of another batch in respect of production of other packagings, it is desirable if, in another embodiment, the stamping lines are set back in recessed relationship into the surface of the wall panel, that is to say they are so-to-speak negatively stamped. It can be said that in the first-mentioned embodiment where they project in outwardly raised relationship, they are positively stamped. The man skilled in the art knows that the height of the U, that is to say the stamping line, around which the latter projects from the wall panel, projects from the wall panel by a greater or lesser amount, depending

on the respective paper thickness or the thickness of some other material. The height of the stamping therefore provides information about the gauge of the material, above the thickness thereof. In accordance with the invention therefore measurement is possible in the Z-direction, just like the measurements in the X-Y-plane, which are also possible in relation to other markings. It will be appreciated that additional items of information can be introduced into the marking or can be read therefrom by virtue of the positive stamping upwardly and/or the negative stamping downwardly.

When using the novel marking, in the event of deviations it is possible to alter the stroke movement of the filling machine and adapt it to the stamping lines which are actually present. It is also possible to detect the volume of the packaging. Furthermore it is possible to establish the position of the longitudinal sealing seam and implement a correction in the travel movement of the material web if the angular positioning of the direction of travel should deviate from the reference value. It is also possible to sense the connecting seam between two material webs. Such a connecting seam is always necessary when a feed roll of material is depleted and has to be replaced by a fresh roll. The end of the depleted roll then has to be stuck or welded to the beginning of the new roll. The operation of shaping the entire pack can be implemented with a higher degree of precision and it will be apparent that less expensive measurement and control is afforded by virtue of the simplicity of the means involved. Production of packs of the kind set forth in the opening part of this specification and also the blanks for same is thus considerably improved in comparison with the known solutions. If the repeat length is read out over a plurality of packagings (between 5 and 15 packagings), the frequency of the repeat length can be analysed and read in as an additional parameter.

If the marking is produced by forming stamping lines by the process according to the invention, in such a way that the cross-section of the material after the stamping operation is U-shaped and in that respect the thickness of the material remains substantially equal, that provides a highly advantageous signalling possibility. Detectors which scan the marking for different physical properties detect the stamping lines – as viewed in cross-section – by virtue of the stamping line being convex at the surface in question from which it projects in raised relationship – and being concave on the opposite side. Therefore, additional items of information can be provided in a marking which is already quite simple if both positive and also negative stamping of the area of the material web in question is possibly implemented.

In that respect it can be particularly advantageous if, in accordance with the invention, the stamping lines are already produced when processing the material web in the paper mechanism. The stamping lines can be provided either together with the operation of producing the fold lines for shaping of the packaging, at the same time therewith or also thereafter. As fold lines have to be provided in any case and as those fold lines can also be produced for example by stamping, the simplicity of the process according to the invention for producing a marking by stamping is readily apparent. In many embodiments the printing mechanism for applying decoration is disposed in the

downstream region of the machine. The marking by means of the stamping lines can therefore be produced beforehand in such a way that the items of information for further processing of the material web or the subsequent blank can be observed and controlled by way of the marking.

In accordance with the invention observation is effected with reading devices when carrying out the pack production process. Various physical principles are available in this respect and successful operational tests have already shown that the stamping lines can be sensed, detected and registered mechanically by a sensor or optically or acoustically by a suitable measuring transducer. A structure with an acoustic measuring transducer has been designed in a particularly advantageous manner. In that case the material web is caused to pass through between an ultrasonic transducer and a recording unit arranged at a spacing therefrom. The material web therefore has an ultrasonic beam passing therethrough and damps it. Very accurate results can be very rapidly obtained therefrom. It is also possible to measure ultrasonic beams which are reflected at the surface of the material web. Such ultrasonic measurement is implemented with or without optical measuring transducers. It will be seen that previously known sources of error which occur in particular in connection with optical measurement procedures can be highly advantageously eliminated.

In all measuring processes which so-to-speak send a beam on to the marking and utilise the influence of the marking for measuring purposes, it is desirable if the beam in question (an optical beam, an acoustic beam or also a mechanical path of movement) involves all lines of the marking. If the embodiment with the above-described rhombus which is inscribed in the two rectangles is considered, then hitting all lines of a marking with a beam is successful in the particular limit situation where the scanning beam is on the line of symmetry of the marking. That beam therefore extends parallel to the longitudinal center line of the blank, parallel to the long side walls of the large rectangle and centrally therethrough so that it also passes through the connecting corners of the rhombus.

If the situation involves a departure from that limit situation, it is desirable to use two mutually spaced sensors as the reading device according to the invention, whether they involve mechanical sensors or optical or acoustic sensors. When they are active the two sensor beams define a window which permits detection of the optimum amount of items of information from the marking.

In that way it is possible for the marking to be produced, read and used for controlling the subsequent steps in a highly effective manner not only in the filling machine but also in the case of using composite material with paper as the carrier material and producing packagings continuously from a tube in the paper mechanism. For example, in the paper mechanism, it is possible to control the cutting operation, which earlier was only possible after an additional marking had been printed on the material. It is possible to measure the angular orientation of the transported paper web. As in the case of the filling machine, in the paper mechanism it is also possible to detect the connecting seam between two rolls, namely the old empty depleted roll and the fresh roll.

So that the values which are measured and read from the marking can be compared to predetermined reference values and ultimately the actual value is set in coincident relationship with the reference value, there is the above-mentioned mathematical correlation between the marking on the one hand and the packaging blank on the other hand. In that respect, spacings are measured between points on the marking, which occur or are determined by cutting lines of the marking on the one hand and cutting sensor beams with given lines of the marking on the other hand. The main value compared in that respect (reference and actual) is the value e of the pack diagonal. It is important for the mathematical correlation that each measurement is multiplied by a factor which for example could be referred to as the proportionality factor. Each measurement is multiplied by such a factor Xi. In that way it is possible to bring the geometry of the packaging into conformity with the stamped marking. With a suitably selected factor, that provides for a reduction in the actual blank values. That affords the advantage that the measurement procedure which in fact takes place at the marking achieves a greater degree of accuracy, for variations in the reading speed can be eliminated by virtue of the miniaturised dimensions. The measurement procedure can be made more accurate as a result.

The sensors which are arranged stationarily at a spacing from the marking, in the preferred embodiment, scan the marking with at least one and preferably two sensor beams which pass in mutually spaced and parallel relationship over the marking. Depending on the respective kind of pack involved (square or rectangular pack), the lines on the marking which are to be cut and detected as measurement points are predetermined for the sensor.

Further advantages, features and possible uses of the present invention will be apparent from the description hereinafter of preferred embodiments by way of example with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic perspective view of a machine for producing a packaging from the tube which is produced from a partly continuously and partly intermittently driven web of composite material with paper as the backing material,

Figure 2 is a view on an enlarged scale of a specific embodiment of a liquid pack prior to the triangular flaps being folded over, with two stationary sensors,

Figure 3 shows a plan view of the blank of a packaging, wherein the lines indicated by the double-headed arrows A and G reproduce the direction of travel of the blanks in production of the packaging, and of the second blank disposed thereover, only the marking is shown,

Figure 4 is a greatly enlarged view showing the marking which is produced by stamping and which is disposed firstly on the material web, then on the blank and finally on the packaging, and

Figure 5 diagrammatically shows the rhombus in the central part of the marking in Figure 4, the stamping lines being shown by continuous lines.

Without limiting significance, reference is here made more specifically to the production of a liquid packaging for liquid foodstuffs. In this respect the packaging is produced in the manner shown

in Figure 1 by the machine generally identified by reference 1 from the web 2 of packaging material which has paper as the carrier material. The packaging material is drawn upwardly in web form from a supply roll 3 and bears the fold lines which are generally identified by 4 and of which it is possible to see for example the longitudinal fold lines 5 and the transverse fold lines 6 which have been singled out for illustrative purposes. After passing over the deflection roller which is shown most upwardly in the machine 1, the web 2 moves downwardly in the conveying direction 7 of the web as illustrated in Figure 1. The tube 9 is folded and provided with a downwardly moving longitudinal sealing seam by means of the longitudinal sealing device generally identified by 8. That tube 9 is filled with product, for example milk or juice, by way of the filling tube 10. Provided on the outside of the tube 9 at a spacing from each other are markings 11 which can be read by means of a sensor 12 and processed in a processing and control unit 13. It is desirable to provide the arrangement of two sensors 12 with their feed lines 12', which are stationarily fixed to the machine and emit the sensor beams S1 and S2. Substantially final shaping of the filled pack and also transverse sealing thereof are effected in the shaping and transverse sealing unit 14 which is connected at a downstream location in the conveying direction 7 and which is shown at the bottom in the machine 1. Therebeneath it is possible to see the filled and closed packaging 15. After passing through a final shaping unit 16, the parallelepipedic pack 17 shown in Figure 1 is then the end result.

A so-called rectangular pack is shown in a perspective view in Figure 2. This involves the packaging 15 shown on an enlarged scale, having the transverse sealing seams 18 and 19 and the bottom wall panel 20 on which the marking generally identified by reference 11 is stamped. Other substantially flat wall panels could also serve as carriers for the marking 11. The bottom wall panel 20 of the packaging 15 however is particularly well visible and is also readily accessible for sensors arranged in a machine, and for that reason this location is preferred for the embodiment described here.

The man skilled in the art is aware that the parallelepipedic pack 15 shown in Figure 1 or also in Figure 2 is produced from blanks for the man skilled in the art is aware of the machine in Figure 1 from the point of view of principle. For the sake of simplification and explanation reference is made here to a blank which is shown in Figure 3 and which also permits production of a parallelepipedic pack in the above-described manner. The web 2 is formed from a series of mutually adjoining blanks in the manner shown in Figure 3. Accordingly, when considering Figure 3, further blanks are to be envisaged as being above and below the blank there, so that it is possible to see the position of the material web. The conveying direction 7 of the web and thus also the blank is parallel to the longitudinal fold lines 5 of the blank generally identified by reference 21. In a corresponding manner, it is possible to see transverse fold lines 6 which are arranged perpendicularly to the longitudinal fold lines 5 and between which are formed triangular panels 22. The bottom wall panel 20 is disposed at bottom right in the case of the blank 21 in Figure 3. The marking 11 can be seen there. Reference 11' at the top indicates the next marking of the next blank

which is not further shown. The spacing between the two markings 11 and 11' is the so-called repeat length G, that is to say the total height of the blank 21. D corresponds to the position about the transverse and longitudinal axes.

The wide side wall panel 24 is disposed between the two narrow side wall panels 23 and 23', separated by two longitudinal fold lines 5. The width of the wall panel 24 is indicated by B in Figure 3. The width of the respective narrow side walls panels 23 and 23' respectively is indicated by C in Figure 3. A is the total height of the blank from the upper cross-sectional line to the lower cross-sectional line, this can also be referred to as the repeat length which can represent a reference value. The overall width of the blank 21, measured perpendicularly thereto, is identified by the broken line of the double-headed arrow E. A more detailed discussion of the blank and its lines does not seem necessary here for the man skilled in the art knows the forms of blank for the various folding boxes and parallelepipedic packs and so forth. The man skilled in the art is even aware of markings applied to the one wall panel or another of a blank, although not in the form illustrated here and certainly not in the configuration described here.

The shape and configuration of the marking are now described with reference to Figure 4. What is essential is that the material processed in accordance with the invention is a stampable packaging material. The marking 11 comprises the most widely varying stamping lines 25. If the web of packaging material is passed through a stamping roller and counterpart roller of suitable design configuration, then the packaging material curves between the rollers, forming the stamping lines 25. If a cross-section were to be laid therethrough, the result would be a U-shape in per se known manner. The thickness of the material remains substantially unchanged in front of and behind the stamping line and even within the stamping line. Therefore a stamping line always projects towards one side of the material web.

In accordance with the invention it is assumed here that the outside of the pack is the top side and, in a preferred embodiment, the stamping lines are positively stamped in the sense that the lines project in raised relationship from the bottom wall panel 20 of the packaging 15. Therefore with reference to Figure 4, the stamping lines 25 project in opposite relationship to the direction of view.

In the embodiment illustrated here the marking 11 is of a particularly selected form. At least two straight stamping lines 25, namely all stamping lines, intersect. It can be seen that the pattern or configuration shown in Figure 4 is center-symmetrical. The marking has an outer rectangular frame 26 with two long sides 27, 27' which extend in the conveying direction 7 of the material web and two short sides 28, 28' which are in perpendicular relationship thereto. The long sides 27, 27' of the rectangular frame 26 extend parallel to the longitudinal fold lines 5 in the blank 21 when laid flat, as shown in Figure 3. Inscribed into that outer rectangle (the frame 26) is an inner rectangle 29 whose transverse sides 30, 30' extend at a spacing from the short sides 28, 28' of the outer frame 26 and whose long sides coincide with the long sides 27, 27' of the frame 26. Travelling successively along the lines 27, 28', 27' and finally 28 involves travelling around the outer rectangle, the frame 26.

Travelling along the following lines: the central part of the long side 27, the transverse side 30', the central part of the other long side 27' and the transverse side 30, involves travelling around the inner rectangle 29.

A rhombus 31 is inscribed into the inner rectangle 29 in such a way that its vertical diagonal 32 also extends in the blank in parallel relationship with the longitudinal fold lines 5. The two transverse sides 30, 30' of the inner rectangle 29 meet at their center the connecting corners 33L and 33N of the rhombus 31. The two transverse sides 30, 30' of the inner rectangle 29 touch the corners 33L and 33N of the rhombus 31 in such a way that the connecting corners 33L and 33N touch or intersect the respective side 30 and 30' of the inner rectangle 29 at the center so that in other words here is the center of the respective side 30 and 30' respectively. Therefore the diagonal 32 of the rhombus 31 in the prolongation is the line of symmetry of the overall marking 11.

The central part of the marking of Figure 4 is shown once again on an enlarged scale and in diagrammatic form in Figure 5. The rhombus 31 has four connecting corners K, 33L, M and 33N. The vertical diagonal 32 would be the connecting line between the corners 33L and 33N. The transverse sides 30' and 30 also extend through the two last-mentioned corners 33L and 33N. Extending perpendicularly in relation to those transverse sides is the sensor beam S1 of the first sensor illustrated. Extending at a spacing and parallel thereto is the second sensor beam S2 of the second sensor 12 which is also mounted stationarily (it is not shown in Figure 5).

If the blank in Figure 3 is considered then the reference dimensions A, B, C and E are to be assumed to be predetermined. In addition the rectangular kind of packaging is to be selected. Corresponding to that kind of packaging, the procedure involves setting at the sensor which of the points on the marking 11, all of which it passes over, are to be detected, in the example in Figure 5 and in the case of the so-called rectangular pack, this therefore involves the points P1 and P2 for the one sensor beam S1 while it involves the points P3 and P4 for the other sensor beam S2.

The spacings A', B', C' which are sensed from the marking are correlated to the actual spacings by way of a factor X1 and X2 respectively. The following apply:

A' = A x X2

C' = C x X1

B' = B x X1.

The actual value D' is further measured from the marking. It provides an indication in regard to the position of the marking and thus the blank in the machine, for example the angular position. Due to temperature or moisture influences and operation of the machine, variations which have an effect on the position of the material web can occur on the path of the material web. D' also provides an indication in regard to the diagonal. This pack diagonal e which has already been mentioned above is predetermined and is then compared to the calculated value e' which arises out of the correlation of measured values:

with e' = $\sqrt{B'^2 + C'^2}$ for rectangular packagings. The value e is compared to the actual value e'. In the ideal case the difference is equal to zero.

The further correlations help for the calculation and thus for the actual-reference value comparison procedure:

with e' = B' x $\sqrt{2}$ for square packagings.

D' = e'x $\frac{1}{\sqrt{2}}$

E' = 4 x D' + Ü x X1 wherein Ü is the overlap of generally 8 mm. That overlap is afforded by the longitudinal sealing seam, for which reason it has to be added to the blank width E in the blank shown in Figure 3.

E = 4B + Ü, when B = C, that is to say the square pack.

E = 2B + 2C + Ü, when B $\neq$ C when a rectangular packaging is involved.

The man skilled in the art therefore sees that the described marking 11 represents a mathematical correlation in relation to the packaging blank 21. In that way it is possible to describe or determine the geometry of the fold lines 4-6 of the blank 21 as shown in Figure 3. By measurement of the illustrated values from the marking 11, it is possible to determine the actual values of a blank, for example the values A', B', C' and E', and then compare them to the reference values. It will be appreciated that E' is a calculated mathematical value, as stated above.

List of references

1	machine
2	web of packaging material
3	supply roll
4	fold lines
5	longitudinal fold lines
6	transverse fold lines
7	conveying direction
8	longitudinal sealing device
9	tube
10	filling tube
11	marking
12	sensor
12'	supply and connecting lines
13	processing and control unit
14	shaping and transverse sealing unit
15	packaging
16	final shaping unit
17	parallelepipedic pack
18, 19	transverse sealing seam
20	bottom wall panel of the packaging 15
21	blank
22	triangular panels
23, 23'	narrow side wall panel
24, 24'	wide side wall panel
25	stamping lines
26	outer rectangular frame
27, 27'	long side of the frame 26
28, 28'	short side of the frame 26
29	inner rectangle
30, 30'	transverse side of the inner rectangle 29
31	rhombus
32	vertical diagonal
33K, 33L, M, 33N	connecting corners
34	horizontal diagonal = largest diagonal of the rhombus 31
A	repeat length (reference value) of the blank 21
B	width of the wide side wall panel (reference value)
C	width of the narrow side wall panel (reference value)
D	value measured from the marking for positional correctness of the pack
G	repeat length (actual value)
E	blank width (reference value)
S1, S2	sensor scanning beam
e	diagonal (reference dimension) of the packaging
A'	sensed repeat length (actual value) of the blank
B'	sensed width (actual value) of the wide side wall panel 24, 24'
C'	sensed width (actual value) of the narrow side wall panel 23, 23'
e'	calculated length of the diagonal (actual value) of the packaging
Ü	overlap
E'	blank width calculated after measurement (actual value)